

List A B C D E

for a Common Carrier Acknowledgement Paging Service. AP is a service which significantly improves the reliability of paging by allowing a subscriber to acknowledge or confirm receipt of a paging message via the pager.^{2/} In its petition, Dial Page explains that a new frequency allocation is necessary to make AP a viable regional service.^{3/} Accordingly, Dial Page proposes that the Commission allocate three channels in the 930-931 MHz band for operation of AP service.^{4/}

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- 2/ As Dial Page explains in its petition, by a mere touch of a button or an automatic trigger mechanism on the pager, a message is transmitted that confirms receipt of a page. If the user does not acknowledge receipt of the page, the user will be continually paged until the page is acknowledged. Thus, a user will never worry whether an expected page was missed. In short, AP ensures that a page is received.
- 3/ Dial Page envisions AP as a regional service. The Commission should take official notice that most carriers operate either wide area or regional systems. Indeed, Dial Page submits that a review of the Commission's files would reveal that all large carriers and most small carriers operate their paging systems with multiple transmitters on the same frequency to provide service to the widest possible area. Paging subscribers are increasingly demanding regional coverage as our society becomes more mobile. Twenty percent of Dial Page's subscribers (or 36,000 customers) currently subscribe to one of Dial Page's regional services. Thus, these subscribers already demand regional service. While there are scattered paging frequencies available throughout most of the country, there certainly are no completely clear channels for the provision of AP on a regional basis. Dial Page believes that use of existing allocated paging frequencies in the 35, 43, 150, 450 or 900 MHz bands would create a delay in the provision of AP service since frequencies are not available on the same channel across the country. Moreover, Dial Page believes that to make AP a viable service, AP must be provided on a regional basis to ensure sufficient demand for the development and manufacture of a frequency specific pager. Manufacturers must have a market large enough to assure that production of a new pager will be profitable.
- 4/ This 1 MHz band includes forty 25 MHz frequencies. Thus, Dial Page's request for three channels is only 7.5 percent
(continued...)

2. By this supplement, Dial Page will further support an allocation for a common carrier AP service. Since the filing of its petition, and as will be demonstrated below, Dial Page has been actively studying the consumer demand and technical feasibility of its AP proposal. Based on its studies, Dial Page has determined that AP has an extremely broad public appeal. In addition, Dial Page launched an extensive program to collect data in support of its proposal. Specifically, Dial Page will explain below the new equipment it has designed for AP and how it plans to demonstrate that the AP system will actually work as it is proposed.^{5/}

II. Proposed allocation for AP Service.

3. In its petition, Dial Page explains that AP service is an enhanced one-way paging service which improves the reliability of existing paging service.^{6/} Thus, Dial Page

^{4/} (...continued)

of the frequency band. Moreover, Dial Page's proposal is for an enhanced one-way paging service and thus, an advanced technology paging system, exactly what the Commission desired this allocation to be used for when it reserved the 1 MHz of a spectrum for potential use by advanced technology paging systems. See Amendment of Parts 2 and 22 of the Commission's Rules to Allocate Spectrum in the 928-941 MHz Band and to Establish other Rules, Policies and Procedures for One-Way Paging Stations in the Domestic Public Land Mobile Radio Service, 89 FCC 2d 1337, 1341 (1982). See also, Note 6, supra.

^{5/} Dial Page received its experimental authorization to test the feasibility of AP service on May 6, 1992.

^{6/} The technical operation of AP utilizes a separate frequency from the frequency on which a page is sent for receipt acknowledgement. (AP is used in conjunction with existing paging frequencies. It does not replace them.) AP is a one-way service. A subscriber cannot interact with the sender of a page as in two-way services, such as cellular.

(continued...)

requests an allocation for a service it believes will greatly be needed in the future and will significantly advance current paging services in the United States. With the advent of nationwide paging, alphanumeric paging, and the possible allocation of spectrum for complex data transmissions services, as proposed by the other petitions (see Note 1), paging services now are already value intensive and are likely to become even more so.^{1/} Clearly, the more important the message, the more crucial the reliability factor. Additionally, as will be shown below, Dial Page has determined that there is a large demand for such service.

4. Dial Page understands the magnitude of the Commission's decision in allocating spectrum, and the difficulty in deciding which service is worthy of an allocation of scarce spectrum. Thus, Dial Page suggests that because there are different proposals for the utilization of all or some of the spectrum, and because no one can predict with absolute certainty the public demand for any of the services, the Commission should allocate these services with a usage benchmark to ensure the allocation meets a consumer need. For example, after a period of five

^{6/}(...continued)

Moreover, the subscriber will be able to send a signal without the need to be paged first.

^{1/} Dial Page submits that the allocation of three channels for AP service does not preclude the allocation of other channels for PacTel's proposed ground-air service and Pactel and Mtel's proposed data transmission services. Dial Page's proposed three channels is only 7.5 percent of the frequency band. The 1 MHz band includes forty 25 MHz frequencies. Thus, there are enough channels available to accommodate several other advanced paging services in addition to Dial Page, with spectrum left over.

years, each new advanced messaging service should be evaluated to determine whether there are at least some minimum number of users of that service.^{8/} If the usage of the service does not meet that standard, the spectrum should be returned to the Commission. Such a standard would ensure that valuable spectrum would not lie fallow for some unforeseeable time.

**III. Advanced Messaging Service Proceeding
should remain separate and distinct
from the Personal Communications Service Proceeding.**

5. In regard to the allocation of spectrum in 930-931 MHz band, Dial Page submits that the Advanced Messaging proceeding should remain separate from the Personal Communication Service ("PCS") proceedings for the simple reason that advanced paging services are very different from PCS services. First, Paging services are traditionally one-way services and thus require less spectrum. PCS is a two-way service, similar to cellular service, and would require a much greater amount of spectrum. Proponents of the advanced paging services request only 1 MHz of spectrum compared to the portion of spectrum currently considered in the 1.8 to 2.2 GHz band, which is 400 MHz, for PCS.^{9/} Second, if advanced paging services are forced to operate at higher frequencies, service will be far more costly due to the inherent nature of the spectrum. Third, new paging services can be implemented far more readily than PCS services. PCS is still in

^{8/} The party proposing the allocation or perhaps the industry association could conduct a valid statistical survey to determine usage of a service.

^{9/} See Amendment of the Commission's Rules to Establish New Personal Communications Services, 6 FCC Rcd 5555 (1991).

the early stages of development and will obviously take much longer to not only develop equipment and infrastructure but to gain consumer acceptance. Finally, substantial controversy exists over PCS because of possible displacement of current spectrum users on certain frequency bands. The 930-931 MHz band has already been reserved for advanced paging services and thus there are no displaced users on that spectrum to battle for the spectrum. Accordingly, this spectrum could be more readily allocated. Finally, should the Commission combine the two proceedings, advanced paging services would be held hostage to the controversy surrounding the PCS proceeding and the implementation of new paging services could be delayed needlessly.

IV. Consumer demand for AP Service.

6. Following Dial Page's market focus studies, and as demonstrated in Attachment 1, AP has a very broad public appeal. Dial Page has documented a demand through an Arthur D. Little market study of 4 million consumers that are currently subscribing to paging service, as well as a forecast of an additional 4 million consumers that would subscribe to a service such as AP. See Attachment 1, Depictions 1 and 2. Clearly, those numbers alone speak for the public need for such a service.

7. One reason AP is so widely accepted among consumers is that AP is perceived to be a low cost way to make existing paging services more valuable. Moreover, while innovative, AP does not utilize or attempt to utilize any unnecessary technological innovation that may not work. As Dial Page's profile study

demonstrates, most users are medium income small business operators. See Attachment 1, Depictions, 4,5, and 6. These are the subscribers who are in need of reliable communications services because they do not have large staffs. Those subscribers view AP service as a natural extension of paging service, and find that it is a service that "makes sense."

V. Technical Feasibility.

8. Since the filing of its petition, Dial Page has refined its proposal. As explained in its petition, technically AP service will utilize existing paging frequencies for the outgoing page and the newly allocated frequencies to acknowledge receipt of the page.^{10/} The paging receiver and transmitter will use a standard paging receiver which includes the acknowledgement transmitter. The acknowledgement of a page can be automatic or can be activated by a button on the unit. Acknowledgements can be pre-programmed canned messages such as "pager received page" or "I received page" or "will call in one hour." These messages will be customized for each user.

^{10/} As demonstrated in the Engineering Statement, Attachment 2, AP service will employ a customized front end acknowledgement controller unit for acknowledgement service. The acknowledgement controller unit will store a page, assign an acknowledgement number to each pager, send the page to a paging terminal, poll an acknowledgement receiver for pages that are acknowledged and re-send a page if no acknowledgement is received after a preset interval. Upon receipt of acknowledgement, the controller unit can store the acknowledgement for later retrieval, or send the acknowledgement back to the original calling party or a third party via the PSTN. In addition, the front end controller can deliver an acknowledgement to other remote front ends if the customer is registered as a regional or nationwide traveler.

A. Proprietary technology developed for AP.

9. Dial Page has developed new proprietary technology to facilitate receipt of the acknowledgement transmissions. This technology is unique to AP and supportive of Dial Page's innovative proposal.^{11/} Following extensive market studies conducted to determine customer demand and equipment acceptance for the proposed AP service, Dial Page determined that to satisfy consumer expectations, the AP unit must be designed to be comparable in size and weight to existing alphanumeric pagers.^{12/} Moreover, Dial Page determined that most consumers prefer a unit with disposable batteries.

10. Dial Page has actively engaged in the technical design of the AP system to meet customer acceptability expectations and provide high system capacity through "reuse." Dial Page proposes to integrate a low power (one-watt or less) transmitter into existing paging receivers. The low power signal transmitted by the acknowledgment pager is delivered to a network of receivers for temporary storage until polled by the Acknowledgement Controller.^{13/} These receivers will be deployed around the city with a coverage of approximately 27 square miles per receiver.

^{11/} Dial Page is in the process of obtaining a patent for its new technology. In its Supplement to Pioneer's Preference Request filed on March 27, 1992, Dial Page first noted its development of the receiver for AP.

^{12/} After its determination of the large consumer demand (4 million consumers currently receiving paging service), Dial Page sought to determine equipment acceptability.

^{13/} Acknowledgment messages will be transmitted in short bursts of digital information using a low powered transmitter built into the pager.

11. Because the AP unit must use low power transmitters, the technology deployed by the receiver network becomes critical. Receivers must be capable of receiving weak signals and demodulating them in the presence of narrow band and wide band interferences. After extensively investigating the commercial market for receivers to meet the needs of the AP design, Dial Page determined it would have to develop its own receiver. Accordingly, based on its research of existing products, and on its experience in the paging industry, Dial Page has designed a proprietary Digital Signal Processing Receiver ("DSPR") that is uniquely suited for the AP system. As explained clearly in the Engineering Statement, attachment 2, this product has direct application for any process requiring extremely precise tone decoding or detection of weak signal in a noisy environment.^{14/} Dial Page's newly designed technology undoubtedly supports the viability of the AP system.

B. Experimental Program.

12. Dial Page has developed a program to test the technical feasibility of AP service. Attachment 2, Section 4 sets forth a review of system test results and future test plans. Specifically, the tests described in the engineering study will demonstrate that the low power transmitters proposed will deliver a reliable signal to the network of digital receivers.

^{14/} In addition to its obvious benefit to the AP system design, Dial Page believes this technology has additional commercial applications. Specifically, this technology can be used to improve the operating performance of any long range RF data communications. Examples of these applications include alarm, automatic meter reading, telemetry and control, and credit card verification systems.

In addition, the study demonstrates that the proprietary receiver will allow for reliable data transmissions in a high noise environment with high power adjacent interference. As described in Section 4, the test program involves a series of field and laboratory tests. Each test is described in detail, explaining the experiment goal, setup and if completed, test result.

VI. Conclusion.

13. Dial Page respectfully requests that the Commission initiate a rulemaking proceeding to allocate spectrum and adopt rules for Acknowledgement Paging. Through its ongoing tests and market focus studies, Dial Page submits that AP service is an economically viable, technically feasible advanced paging service that will meet a consumer demand and surely better the paging industry in the United States.

Respectfully submitted,

DIAL PAGE, L.P.

By: 
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Its Attorneys

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Dated: June 1, 1992

Attachment 1

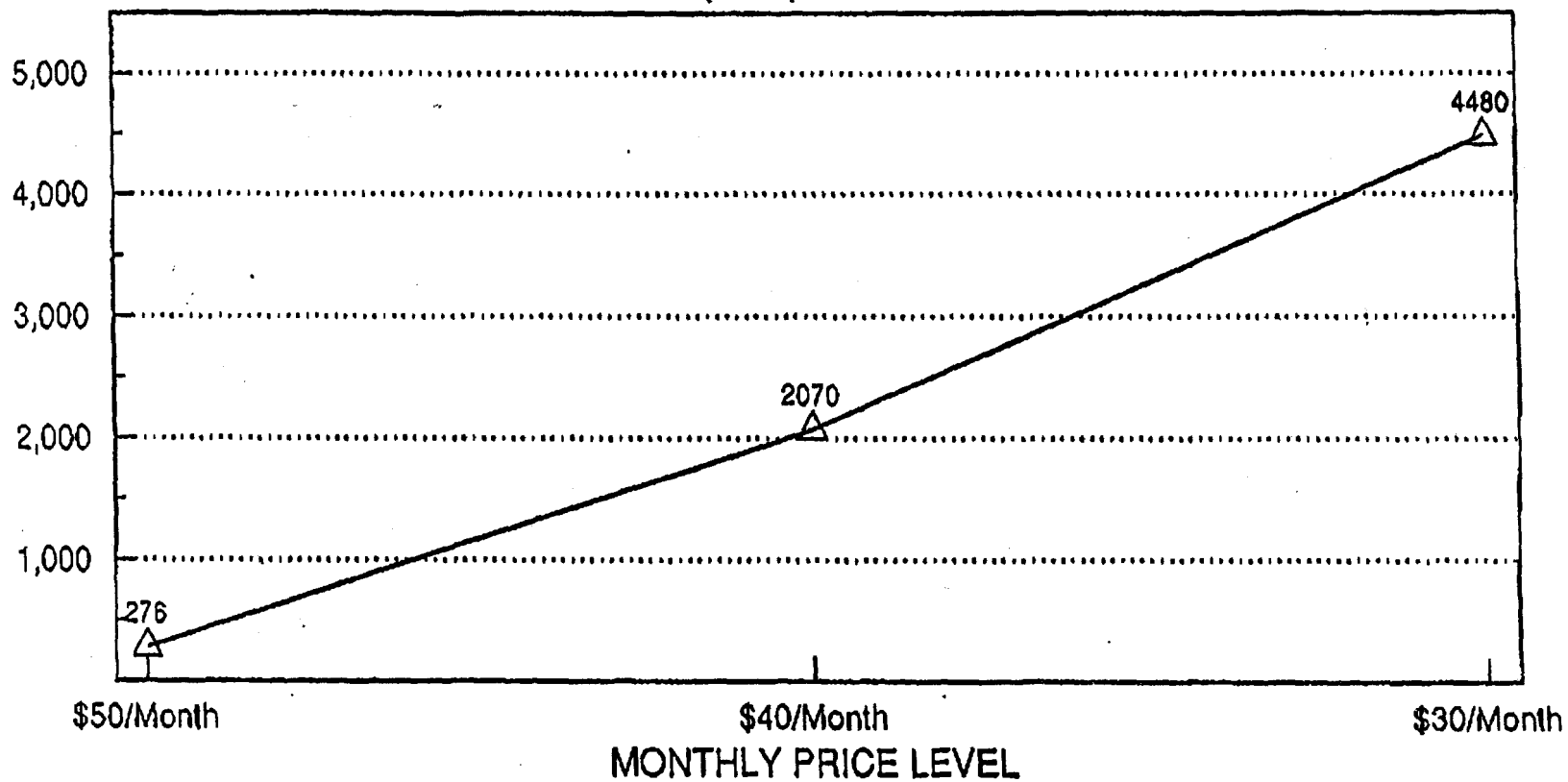
Arthur D. Little Market Study

- | | |
|-------------|--|
| Depiction 1 | Incremental demand for message-back paging among non-paging households. |
| Depiction 2 | Likely demand for message-back paging among current paging users. |
| Depiction 3 | Target market for message-back paging among non-paging users (need for being reached while away from phone). |
| Depiction 4 | Target market for message-back paging among non-paging users (occupational groupings). |
| Depiction 5 | Target market for message-back paging among non-paging users (income groupings). |
| Depiction 6 | Target market for message-back paging among non-paging users (respondent age). |
| Depiction 7 | Target market for paging users among current dial page customer (number of full-time employees). |

INCREMENTAL DEMAND FOR MESSAGE-BACK PAGING AMONG NON-PAGING HOUSEHOLDS

Prices Varied from \$30 to \$50 per Month

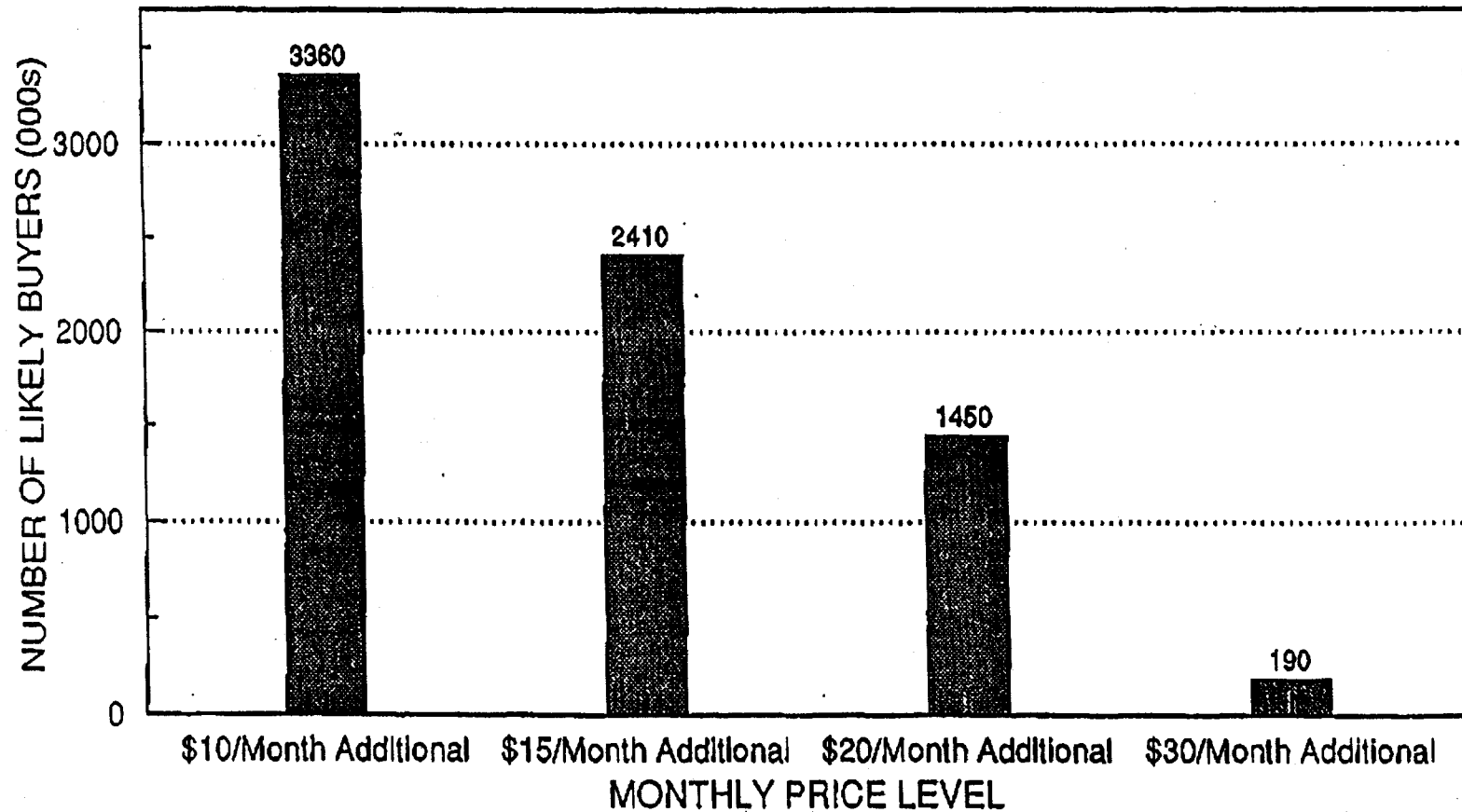
HOUSEHOLDS LIKELY TO ADOPT SERVICE (000s)



Assume one pager purchase per interested household.

Arthur D Little

LIKELY DEMAND FOR MESSAGE-BACK PAGING AMONG CURRENT PAGING USERS Nationwide Projections



Base = 10 million current paging users

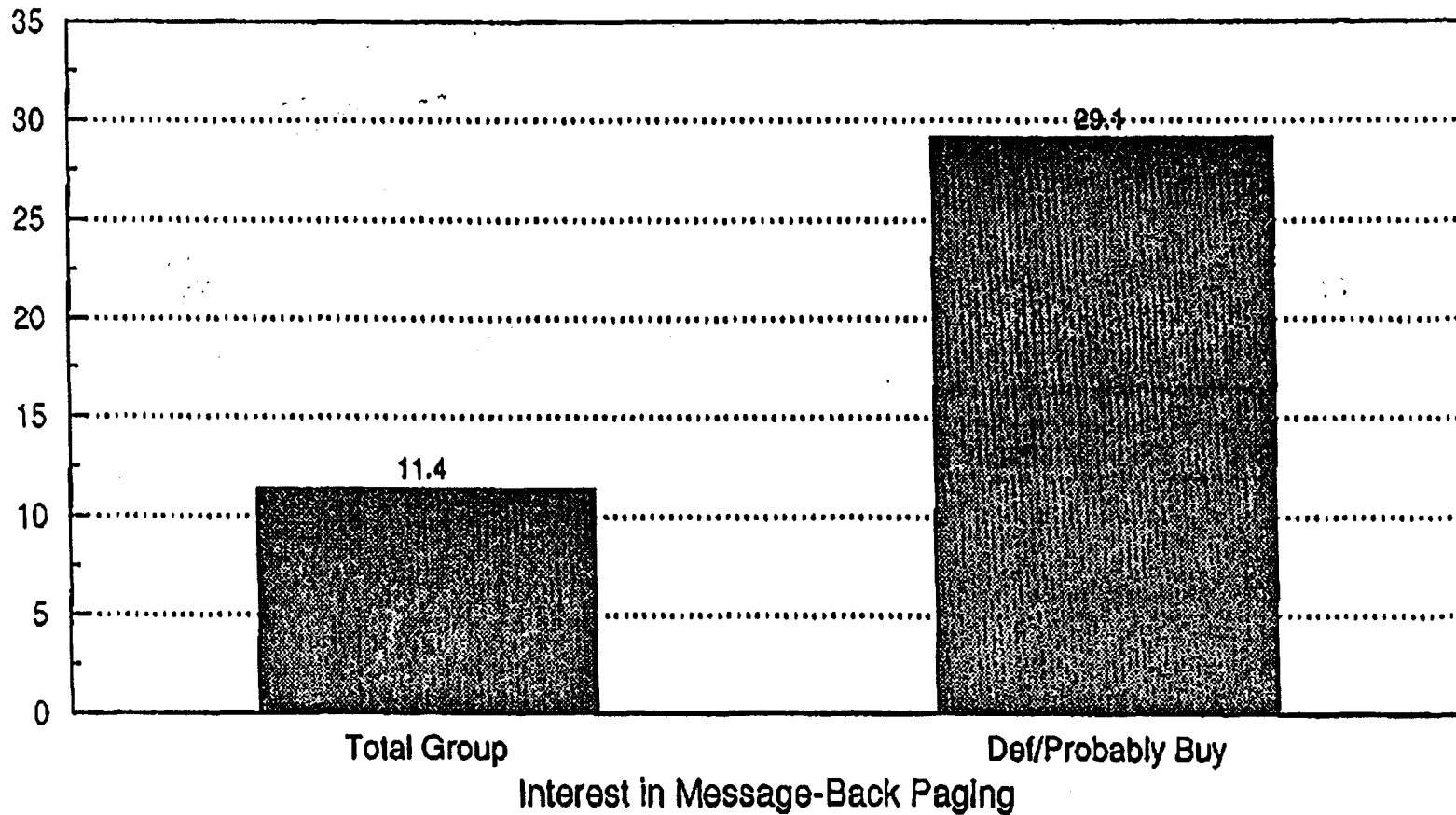
Arthur D Little

DEPICTION 2

TARGET MARKET FOR MESSAGE-BACK PAGING AMONG NON-PAGING USERS

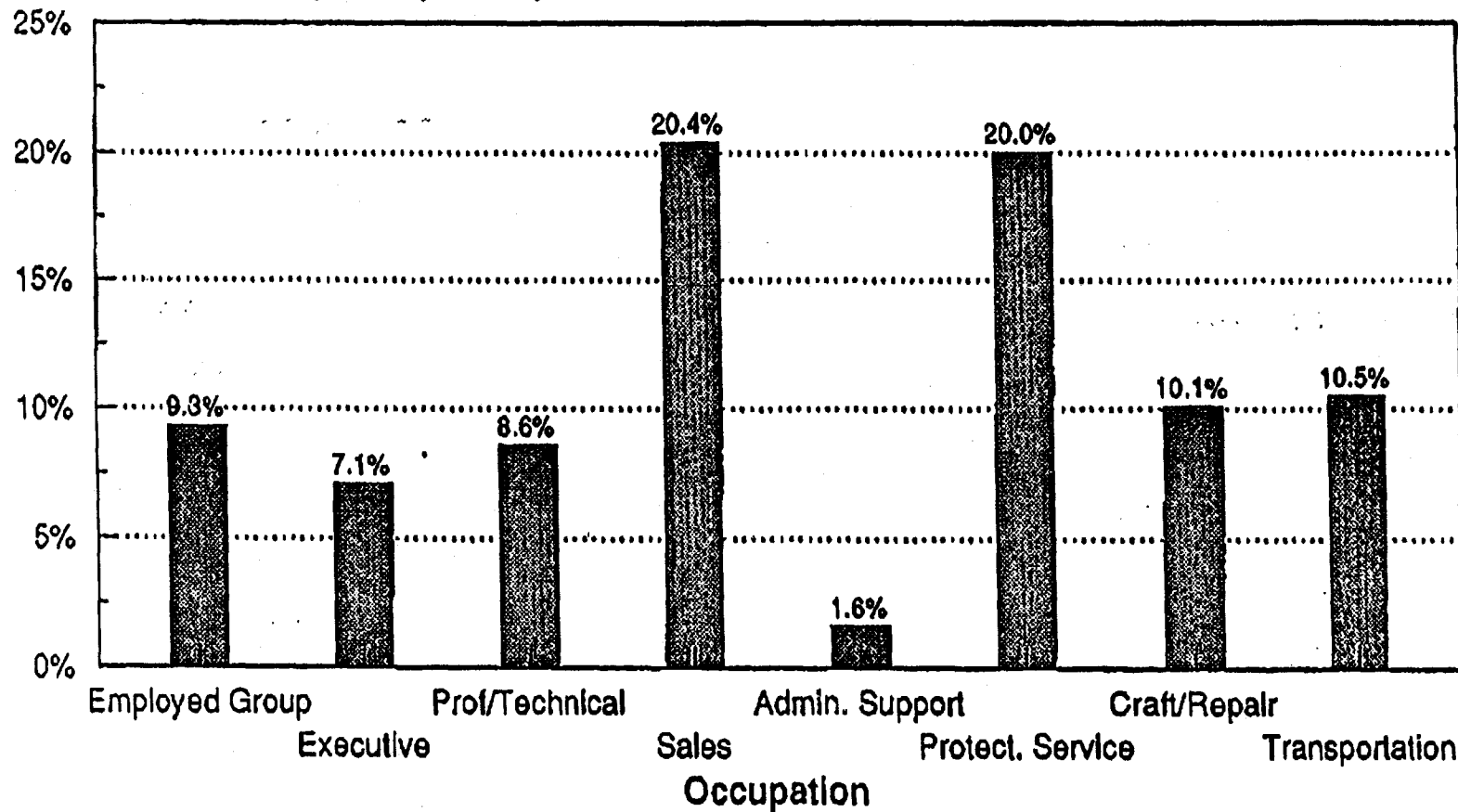
Need for Being Reached While Away from Phone

Avg. Times Per Month When Need to be Reached



TARGET MARKET FOR MESSAGE-BACK PAGING AMONG NON-PAGING USERS Occupational Groupings

% Definitely/Probably Likely to Buy



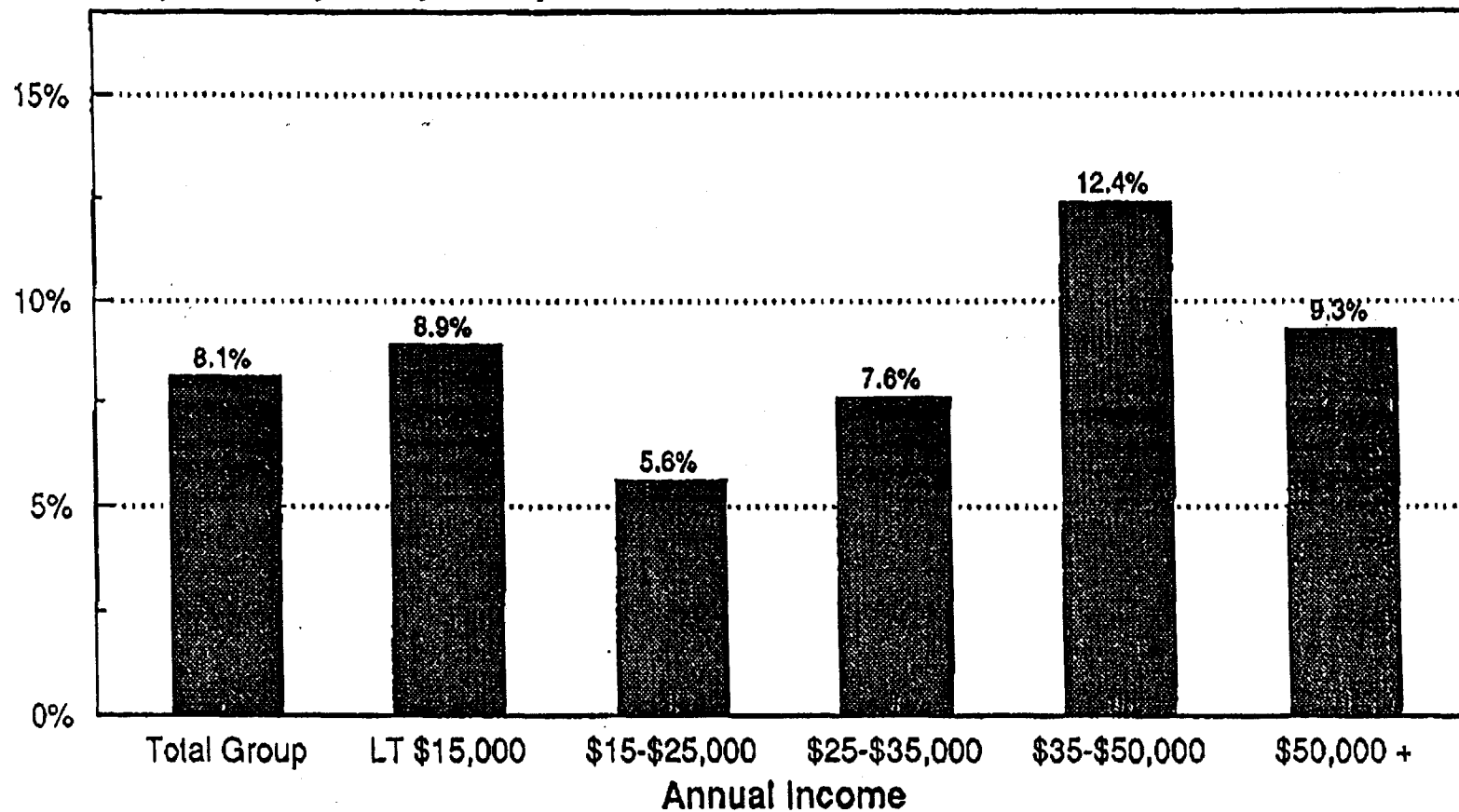
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DEPICTION 4

TARGET MARKET FOR MESSAGE-BACK PAGING AMONG NON-PAGING USERS

Income Groupings

% Definitely/Probably Likely to Buy

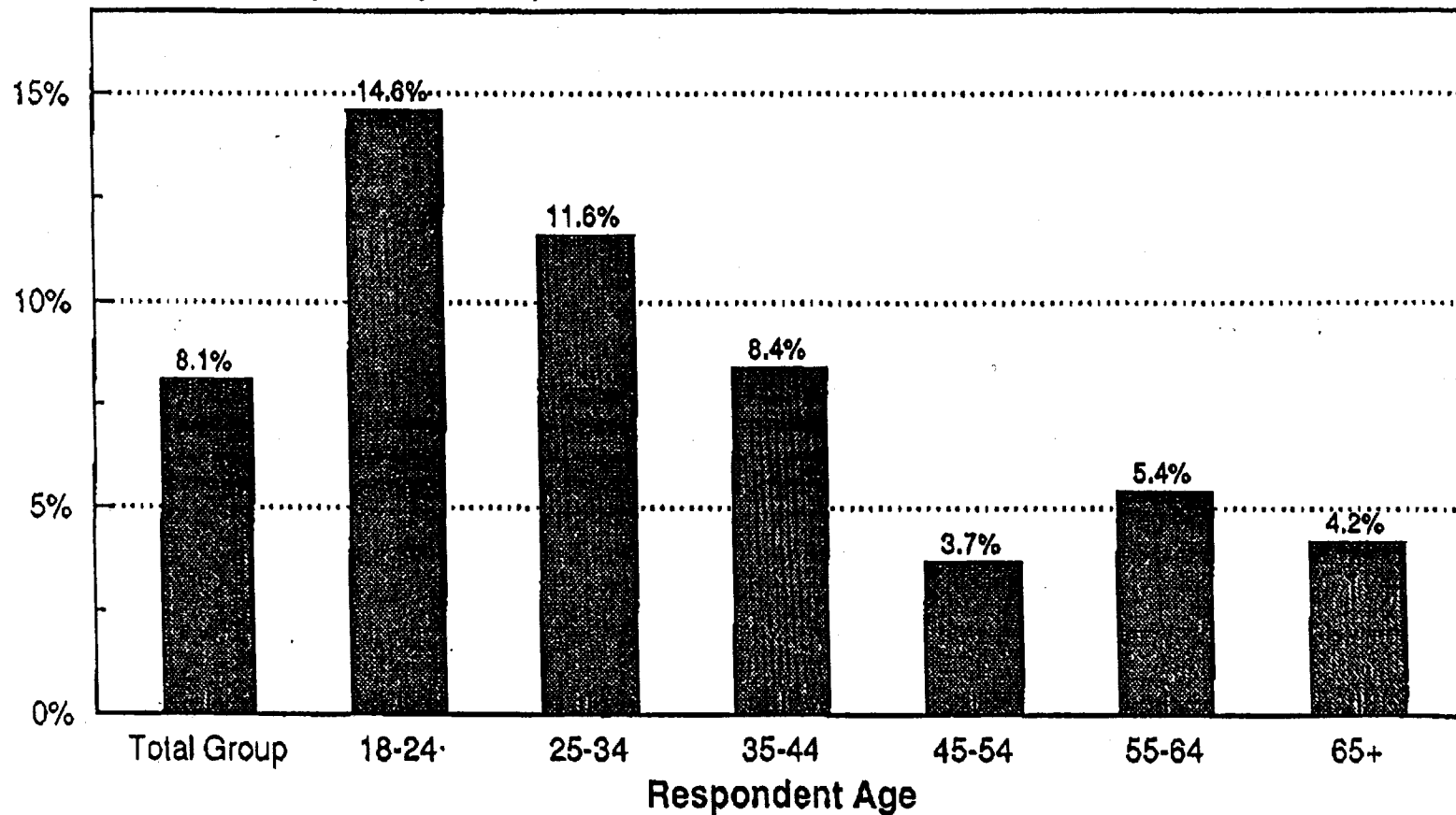


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TARGET MARKET FOR MESSAGE-BACK PAGING AMONG NON-PAGING USERS

Respondent Age

% Definitely/Probably Likely to Buy



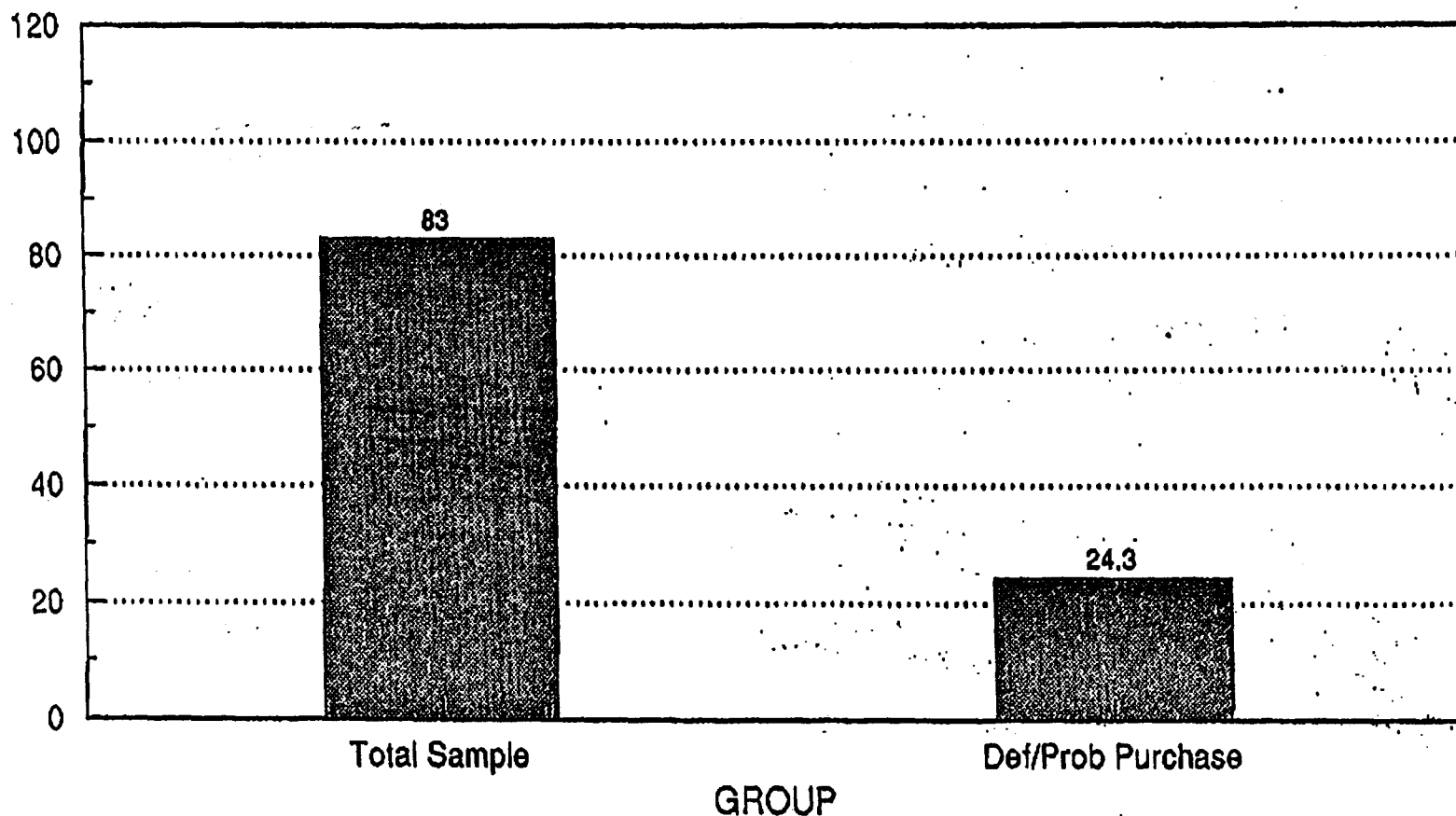
DEPICTION 6

Arthur D Little

TARGET MARKET FOR PAGING USERS AMONG CURRENT DIAL PAGE CUSTOMERS

Number of Full-Time Employees

NUMBER OF FULL-TIME EMPLOYEES



ATTACHMENT 2

**ACKNOWLEDGEMENT PAGING
ENGINEERING STATEMENT**

PREPARED BY:

**DAVID I. ODOM
VICE PRESIDENT
ENGINEERING
DIAL PAGE, L.P.**

OUTLINE

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Section 1:

Acknowledgement Paging Engineering Statement

Overview

The purpose of this engineering statement is three fold:

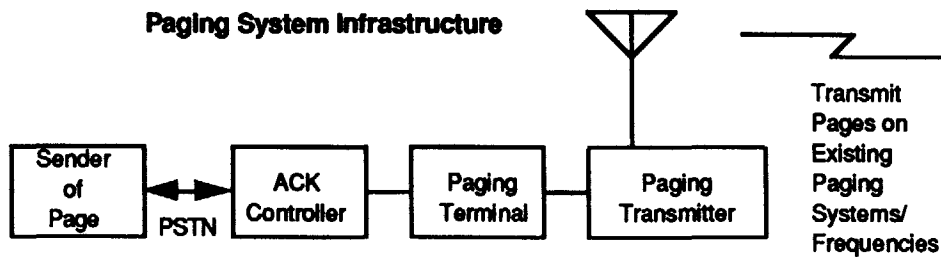
- A. Outline key elements of the Dial Page Acknowledgement Paging system.
- B. Present a description of the proprietary technology that Dial Page has developed to facilitate receipt of acknowledgement transmissions.
- C. Review the technical feasibility demonstration plan for Acknowledgement Paging, including tests that have been completed and the experiments planned for completion by September 1, 1992.

Section 2:

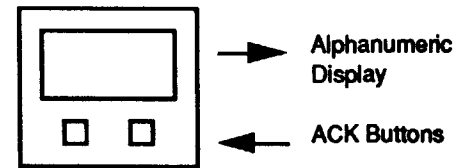
Acknowledgement Paging System Design:

The key elements of the Acknowledgement Paging system design are presented on the following page.

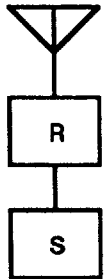
ACKNOWLEDGEMENT PAGING SYSTEM



Paging Receiver/ACK Transmitter



Acknowledgement Receiver/Storage Units



- Customized front end acknowledgement controller unit for acknowledgement service. Other infrastructure used to transmit pages is standard equipment.
 - • Acknowledgement controller performs the following functions:
 - Stores pages
 - Assigns acknowledgement number to each pager
 - Sends page to paging terminal
 - Polls acknowledgement receivers for pages that are acknowledged
 - Re-sends pages if no acknowledgement is received after preset interval
 - Upon receipt of acknowledgement, controller can store acknowledgement for later retrieval, send acknowledgement back to original calling party via PSTN or send acknowledgement to third party.
 - Front end controller can deliver ACK message to other remote front ends if customer is regional or nationwide traveler.
- Uses standard paging receiver.
 - Unit has ACK transmitter included.
 - Acknowledgement can be automatic. from unit, or user defined simple (3 button operation) "canned" messages.
 - ACK messages are transmitted in short bursts of high speed data using low power transmitters (e.g. 2 watts).
 - Transmitter channel bandwidth standard 25 KHZ.
- Acknowledgement receivers receive ACK messages from pagers.
 - Message is stored for later polling by front end ACK controller.
 - Polling is done by either telco lines or radio from each receiver to front end acknowledgement controller.

Section 3:

Description of Proprietary Acknowledgement Paging Receiver Technology

Dial Page has proposed that a portion of the 930 MHz spectrum be allocated to Acknowledgement Paging (AP). This proposal is consistent with Telocator's AMS proceeding. Based on market research studies conducted by Dial Page, the demand for Acknowledgement Paging is projected to exceed four million users. To satisfy consumer expectations, the unit must be comparable in size and weight to existing alphanumeric pagers. Disposable batteries with a life of several weeks are also preferred by consumers.

In order to meet these expectations and provide high system capacity through "reuse", the Dial Page AP system proposes to integrate a low power (one-watt or less) transmitter into existing paging receivers. The low power signal transmitted by the Acknowledgement Pager is delivered to a network of receivers for temporary storage until polled by the Acknowledgement Controller. (This system is shown in the AP system design included with this filing.)

Because the AP units use low power transmitters, the technology deployed by the receiver network becomes critical. Receivers must be capable of receiving weak signals and demodulating them in the presence of narrow band and wide band interference. Additionally, the number of receivers used in a system must be kept to a minimum in order to reduce capital and operating costs.

In its program to develop the AP technology, Dial Page has extensively investigated the commercial market for receivers that meet the needs of the AP design. Based on its investigation of the commercial market and its own experience with this technology, Dial Page has designed a proprietary Digital Signal Processing Receiver (DSPR) that is uniquely suited for an AP system. A detailed technical description of this proprietary receiver is contained in Exhibit I of this Engineering Statement.

From a technical design standpoint, this proprietary receiver utilizes the following:

1. High speed automatic gain control utilizing Flash A/D technology, as opposed to the traditional analog gain controls found in conventional receivers.
2. Auto-recursive frequency agile FIR convolution discriminator utilizing a DSP microcomputer and proprietary software, unlike the proprietary

discriminator utilized in the Dial Page receiver, traditional receivers rely on analog discriminators.

3. Hardware and software to implement an auto-correlation using digital, rather than analog techniques.

Based on laboratory experiments comparing the Dial Page DSPR receiver with commercially available receivers, this application provides an improvement of four orders of magnitude in S/N ratio compared to conventional techniques. This technology will undoubtedly result in a major improvement in the viability and cost effectiveness of the Dial Page AP system. Quantification of the benefits of the DSPR in a real world environment will be completed by September 1, 1992 utilizing the F.C.C. experimental 930 MHz license recently granted for Charlotte, North Carolina.

In addition to its obvious benefit in the AP system design, this proprietary technology has several commercial applications. Specifically, this technology can be used to improve the operating performance of any long range RF data communications. Examples of these applications include alarm, automatic meter reading, telemetry and control, and credit card verification systems.